TABLE IV.

Diffusion of Atmospheric CO_2 through Multiperforate Septa into Tube 4 c.m. long. Diameter of Holes ·380 m.m.

No. of Holes per sq. cm.	Diameters Apart	CO_2 Diffusing through Septum per hour c.c.	Open Tube Diffusion per hour c.c.	Percentage of Septum Diffusion on Open Tube Diffusion.	Percentage area of Cross-section occupied by Holes.
100	2·63	·361	·346	104·3	11·34
25	5·26	·148	·342	43·2	2·82
11·11	7·8	·131	·352	37·2	1·25
6·25	10·52	·110	·353	31·1	·70
15·7	15·7	·068	·334	20·4	·31

I must now ask you to follow me in a somewhat theoretical excursion in quest of an explanation of these curious facts.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The following have been elected public examiners:—Mr. R. T. Glazebrook, in physics; Mr. P. Elford, in chemistry; Prof. F. Gotch, in physiology.

The curators of the University Chest have been authorised to spend a sum not exceeding 1400*l.* in certain extensions of the Chemical Department which are necessitated by the loss of the laboratory known as the "Glastonbury Kitchen." The latter is now required as access to the new Radcliffe Library.

A proposal to permit candidates for the degree of Bachelor of Letters or Science to keep more than one term of University residence in the year by residence during the vacation has been rejected.

A proposal to provide access for wheeled traffic to the Departments of Physiology, Human Anatomy and Pathology at the back of the University Museum has also been rejected owing to the opposition of those who regard this as an encroachment upon the University Park.

The Junior Scientific Club held their 226th meeting on May 31. A paper was read by E. Walls, entitled "The Quest of the Philosopher's Stone." Prof. Silvanus Thompson delivered the Boyle Lecture on June 6, on "Magnetism in Growth."

CAMBRIDGE.—In the mathematical tripos, part i., the senior wrangler is Mr. A. Brown, of Caius College, a Ferguson student from Edinburgh. Miss Reynolds, of Newnham, is bracketed 11th wrangler. Three names appear in the first class of part ii.: Mr. J. E. Wright, Trinity (senior wrangler 1890); Mr. T. H. Havelock, St. John's (15th wrangler); and Mr. J. Chadwick, Pembroke (5th wrangler). Miss W. M. Hudson, Newnham, is in the first division of the first class (bracketed 8th wrangler 1890).

The professor of pathology announces ten separate courses of lectures and practical work to be given in the long vacation, beginning July 8.

PROF. R. W. WOOD, of the University of Wisconsin, has been appointed professor of physics in the Johns Hopkins University, in succession to the late Prof. H. A. Rowland.

WE learn from *Science* that the Wisconsin Legislature has granted 210,000 dollars to the University of Wisconsin, at Madison, in addition to the regular income previously derived from the State. Of this sum 150,000 dollars is for a new building for the College of Agriculture, which is to house the administration offices of this department and the experiment station as well as the departments of bacteriology and chemistry. This College also receives 10,000 dollars annual increase to its present income. The College of Engineering receives 30,000 dollars for equipment of its new building, which was provided by the last Legislature; also 7500 dollars annual increase in income. The newly organised School of Commerce secures 3500 dollars annual increase.

DR. H. M. KYLE has been appointed naturalist to the Marine Biological Association and fisheries' instructor for the county of Devon. Dr. Kyle is a distinguished graduate of the University of St. Andrews, having gained the rector's prize for an essay on evolution and having held successively the Fisheries' prize, the Berry scholarship (100*l.*) and, for three years, the Exhibition of 1851 scholarship (150*l.*) for original researches in connection with the fisheries. His studies for seven years have been devoted to marine zoology and the scientific treatment of the problems of the fisheries at the chief marine laboratories of Europe, including Naples, Plymouth, &c., and both the old laboratory and the new (Gatty) laboratory at St. Andrews, where he was trained.

WE learn from the *Berliner Klinische Wochenschrift* that the second annual congress of the German Association for School Hygiene, which was founded about two years ago for the purpose of studying and promoting all matters relating to health and hygiene in connection with schools, was held at Wiesbaden on May 31. The municipal authorities of that city placed the "Curhaus" at the disposal of the council of that association, where all the official meetings were held during the congress. The attendance was a large and a representative one, and the programme contained many important and highly instructive subjects, of which the following may particularly be mentioned: (1) the new Prussian school reform in relation to school-hygiene; (2) the hygienic condition of German schools in general, with special reference to that of Wiesbaden; (3) the prevention of infectious diseases regarded from a general point of view, with special reference to the spread of tuberculous affections amongst school children.

THE *Educational News* of Scotland states that the following is the list of candidates for the chair of natural philosophy in Edinburgh University, vacant through the resignation of Prof. Tait:—Prof. J. C. Beattie, South African College, Cape Town; Prof. G. H. Bryan, F.R.S., University College, North Wales; Dr. Charles Chree, F.R.S., National Physical Laboratory, Richmond; Dr. Cargill G. Knott, University of Edinburgh; Prof. J. P. Kuenen, University College, Dundee; Dr. Charles H. Lees, Owens College, Manchester; Mr. David B. Mair, Civil Service Commission, London; Prof. J. A. M'Clelland, University College, Dublin; Prof. J. G. MacGregor, F.R.S., Dalhousie University, Halifax, U.S.A.; Prof. Karl Pearson, F.R.S., University College, London; Mr. G. F. C. Searle, Cambridge; Mr. George W. Walker, Cambridge; Mr. Gilbert T. Walker, Cambridge; Mr. C. T. R. Wilson, F.R.S., Cambridge.

PROF. RAMSAY expressed the views of a number of teachers and investigators in the annual oration delivered by him at University College, London, last week, on "The Functions of a University." The essential principle of University work should be research. This, said Prof. Ramsay, should be the goal to be clearly kept in view in the philosophical faculties of Universities. He was not one of those who would urge that a young man should not learn a great deal of what had been already discovered before he attempted to soar on his own wings. But there was all the difference in the world between the point of view of the student who read in order to qualify for an examination, or to gain a prize or scholarship, and the student who read because he knew that thus he would acquire knowledge which might be used as a basis of new knowledge. It was that spirit in which our Universities were so lamentably deficient; it was that spirit which had contributed to the success of the Teutonic nations, and which was beginning to influence the United States. A University which did not increase knowledge might be a technical school or a coaching establishment, but it had no claim to the name University. The best way of fitting young men for the manifold requirements of the Empire was to give them the power of advancing knowledge.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, May 16.—Prof. Emerson Reynolds, president, in the chair.—The following papers were read:—Derivatives of methylfurfural, by H. J. H. Fenton and Miss M. Gostling. A simple method of obtaining pure methylfurfural is described.—Optically active nitrogen compounds and their bearing on the valency of nitrogen; dextro- and lævo-α-benzyl-

phenylallylmethylammonium salts, by W. J. Pope and A. W. Harvey. The authors have prepared in a state of purity a number of substances owing their optical activity to the presence of an asymmetric nitrogen atom; it is shown that *d*- and *l*-benzylphenylallylmethylammonium iodides and bromides slowly become optically inactive when preserved in chloroform solution.—Reactions of hydroxyoxamides, by R. H. Pickard and W. Carter. Hydroxyoxamide and its phenyl-, tolyl- and naphthyl-derivatives give the general reactions of hydroxamic acids and are thus quantitatively convertible into substituted biurets and allophanates.—The *sym*-trichlorobromoanilines, and chloro- and bromo-amino-derivatives of chlorobromoacetanilides, by F. D. Chattaway and K. J. P. Orton. The authors call attention to the great resemblance existing between the two similarly constituted *sym*-chlorodibromoanilines, their acetylderivatives and the two *sym*-dichlorobromoanilines respectively.—Replacement of bromine by chlorine in anilines, by F. D. Chattaway and K. J. P. Orton.—The absorption spectra of cyanogen compounds, by W. N. Hartley, J. J. Dobbie and A. Lauder. An examination of the absorption spectra confirms the view that cyanuric acid and methyl cyanurate are similarly constituted, and indicates that the relations between melamine and triethylmelamine are correctly represented by the commonly accepted formulæ.—The nutrition of yeast. Part iii. By A. L. Stern. The author concludes that any increase of nitrogenous or inorganic nutriment beyond a definite limit will not increase either the amount of nitrogen assimilated by yeast or the weight of the yeast; any increase of the added sugar, however, is accompanied by an increase both in the amount of nitrogen assimilated and in the weight of the yeast. The growth of yeast proceeds as long as any sugar remains unfermented and is, during part of the fermentation, proportional to the amount of sugar fermented.—On the colloid form of piperine, with especial reference to its optical refraction and dispersion, by H. G. Madan. On cooling piperine, after heating to 180° for an hour, it remains in the colloidal state for an indefinite time; the colloid has a high refractive index ($\mu_D = 1{\cdot}684$) and exhibits an extraordinarily high dispersive power.—Note on pyromucylhydroxamic acid, by R. H. Pickard and A. Neville.—The condensation of ethylphenylketone with benzaldehyde, by R. D. Abell. Ethylphenylketone and benzaldehyde condense in presence of sodium ethoxide with formation of 1:3-diphenyl-2-methyltrimethylene glycol, benzalpropiophenone and 1:3-dimethyl-1:3-dibenzoyl-2-phenylpropane.—A new method for the determination of hydrolytic dissociation, by R. C. Farmer. The author's method of ascertaining the extent of hydrolytic dissociation depends upon determinations of the free acid or base by distribution between two solvents, one of which dissolves only one of the dissociation products.—The production of some new metallic borides, by S. A. Tucker and H. R. Moody. Crystalline borides having the compositions Zr_3B_4, CrB, WB_2 and Mo_3B_4 are prepared by heating the corresponding metal with boron in the electric furnace.—The action of lead thiocyanate on the chlorocarbonates. Part ii. Carboxymethyl- and carboxyamyl-thiocarbimides and their derivatives, by R. E. Doran.—The chlorine derivatives of pyridine. Part vii. Some condensation products, by W. J. Sell and F. W. Dootson.—The diazotisation of dinitroanisidine and the constitution of the resulting product, by R. Meldola and J. V. Eyre.

MANCHESTER.

Literary and Philosophical Society, May 28.—Prof. Horace Lamb, F.R.S., vice-president, in the chair.—The influence of grinding upon the solubility of the lead in lead fritts, by Dr. T. E. Thorpe, C.B., F.R.S., and Mr. Charles Simmonds. The paper was a criticism of the methods and conclusions contained in a paper by Messrs. Jackson and Rich, read before the Society in October last. The argument of that paper was stated to rest on the assumption that a fritt behaves as a single chemical compound—an untenable assumption. The theory that as a fritt is dissolved by acid a layer of silica is formed on the outside of the particles, protecting them from further action, was opposed as not being in accordance with facts which are easily demonstrated. The particular fritts used by Messrs. Jackson and Rich in their experiments were of somewhat high solubility, and the conclusions arrived at did not hold for those of lower solubility. A fine powder was, indeed, somewhat more soluble than a coarse one, but the variations of solubility of slightly soluble glazes between the limits of fineness occurring in actual practice were of inconsiderable magnitude. Further, whether or not the solubility varied to some extent with the fineness, the matter was of no practical consequence, since glazes could be obtained, and were in use, which were of the fineness used in working and conformed to the limit of solubility suggested by the Home Office. In the discussion which followed Mr. Burton pointed out that even if grinding only produced—as in experiments actually made with fritts of solubility below the Home Office standard—variations of solubility of some 50 per cent., a fritt not far within the limit would be dangerous in use or not according to the fineness of grinding. He also denied that the more soluble fritts are the softer, as alleged by Dr. Thorpe, but stated that the opposite was the fact. He referred to the danger of lead poisoning from inhaled lead dust, a matter in which solubility in dilute acid did not come into account. Mr. Jackson stated that the finer portions of the fritts dealt with by himself and Mr. Rich contained not more but less lead oxide than the coarser portions, contrary to the suggestions of Dr. Thorpe. He mentioned that he had himself found solubilities of from below 2 per cent. to about 5 per cent. from the same fritt at different grindings, the fritt being one which had been passed by Dr. Thorpe as within the Home Office limit. He showed some photographs of glasses acted on by hydrofluoric acid, showing crystalline forms suggestive of distinct heterogeneity even in the clearest glass, and stated that he had certainly not treated the fritts as single chemical substances.

PARIS.

Academy of Sciences, June 5.—M. Fouqué in the chair.—New researches on the neutralisation of phosphoric acid, by M. Berthelot. When an excess of a solution of lime is added to phosphoric acid, the calcium phosphate precipitated has at first the composition $Ca_3(PO_4)_2$, but in presence of an excess of lime a more basic salt is gradually formed, which finally approximates to the composition $H_3PO_4.2CaO$. An analogous compound has been observed in nature, the oxychloride $CaCl_2$, $3CaO$. Similar compounds appear to be formed with baryta.—New researches on the alloys of gold and silver and of other materials arising from Egyptian tombs, by M. Berthelot. Analyses of fragments of gold of the eleventh, twelfth and thirteenth dynasties, of a supposed perfume, and of a copper alloy.—On the magnetic analysis of the radium rays and of the secondary radiation provoked by these rays, by M. Henri Becquerel. A development of the method described in a previous paper.—The physiological action of the radium rays, by MM. Henri Becquerel and P. Curie. Radiferous barium chloride carried on the arm in a thin guttapercha envelope caused at first a reddening of the skin resembling a burn, but without pain. After some days the area of this increased and the skin was broken, and fifty-two days after the action of the rays there still remained a sore. In another experiment with a more active material, the effect of the rays was felt through a glass tube containing the material, a box and the clothes. Inflammation with suppuration was produced in this case after only six hours' exposure to the rays, the wound produced not being entirely healed until forty-nine days after the exposure.—The changes in direction and velocity of an air current which has encountered bodies of divers forms, by M. Marey.—On regressive erosion in the chain of the Andes, by M. de Lapparent. Owing to the possibility of rapid variation of the watershed in this region, the line marking the watershed between the Pacific and Atlantic Oceans, as it exists to-day, does not constitute a true geographical boundary.—On the tellurides of gold and silver in the region of Kalgoorlie in Western Australia, by M. Ad. Carnot. Some analyses of the West Australian minerals sent to the Paris Exhibition. With the exception of some traces of mercury and copper these are practically double tellurides of gold and silver of the type $(Au, Ag,)Te_2$.—On the longitudinal and transversal waves in perfect fluids, by M. P. Duhem.—Contribution to the theoretical and experimental study of liquid veins deformed by obstacles, and on the determination of the lines of induction in a magnetic field, by Prof. H. S. Hele-Shaw. A description of the author's method of photographing stream lines, with three examples. The method not only allows of the verification experimentally of many of the results deduced theoretically in hydrodynamics, but also furnishes a complete solution of many problems of practical importance which it is impossible to attack by mathematical analysis.—Determination of the surfaces which are at the same time surfaces of Joachimsthal and surfaces of Weingarten, by M. L. Raffy.—Observations on electric resonance in rarefied air, by M. Albert Turpain.—The influence of temperature on the electromotive force of magnetisation, by M. Rene Paillot. Using the method described in a previous paper, it was

found that the electromotive force of magnetisation of soft iron increases with the temperature, this variation with the temperature being greater as the field is more intense. With bismuth the opposite effect is observed, the electromotive force of magnetisation falling off as the temperature is raised.—The action of the X-rays on conductors and on insulators, by M. J. Semenow.—On the alloys of aluminium. Compounds of aluminium with molybdenum, by M. Leon Guillet. By reducing molybdic acid with a large excess of aluminium three definite compounds were obtained corresponding to the formulæ Al_4Mo, AlMo, Al_7Mo, analyses of which are given.—On the alloys of aluminium and magnesium, by M. Boudouard. A set of determinations of the melting points of thirteen aluminium-magnesium alloys ranging from pure aluminium to pure magnesium. The curve of results presents three minima and two maxima, pointing to the existence of two definite compounds, $AlMg_2$ and AlMg.—On the cellular structure of some metals, by M. G. Cartaud.—Acidimetry of phosphoric acid by baryta, strontia and lime, by M. J. Cavalier.—On the aluminium contained in mineral waters, by M. F. Parmentier. The author points out that in spite of numerous analyses of the waters from Puits Chomel and Grande Grille the presence of aluminium in notable quantity has been overlooked.—The action of isobutylene bromide on benzene in presence of aluminium chloride, by M. F. Bodroux. The principal products are a butyl-benzene and dimethyl-phenyl-benzylmethane.—The action of the alkyl malonic esters upon the diazoic chlorides, by M. G. Favrel. Ethyl-methylmalonate, treated with a solution of diazobenzene chloride in presence of sodium acetate, gives the phenylhydrazone of ethyl pyruvate. Diazoparatoluene gives an analogous reaction.—On a new mode of decomposition of bisulphite derivatives, by MM. P. Freundler and L. Bunel. Alkaline nitrites may replace the alkaline carbonates in this reaction.—On the secondary products formed in the action of sulphuric acid upon wood charcoal, by M. A. Verneuil. The tetra-, penta- and hexa-carboxylic acids of benzene can be isolated from the residue.—On a new gregarian parasite of the mussel, by M. Louis Leger.—On the cilia of the Ctenophoræ and on ciliary insertions in general, by M. P. Vignon.—Experimental researches on the respiration of annelids. Study of *Spirographis Spallanzanii*, by M. Bounhiol.—The defensive or odorous glands of the cockroach, by M. K. Bordas.—On the structure of the shoot in ligneous plants, by M. Marcel Dubard.—On the proportion of water compared with the ripening of ligneous plants, by M. F. Kövessi.—On the electrolysis of animal tissues, by M. Édouard Branly.—The sources of iodine in the organism. The biological cycle of this metalloid, by M. P. Bourcet.—A method of preparing low brewery yeasts fermenting at a high temperature, by M. Georges Jacquemin.—The otoliths and audition, by M. Pierre Bonnier.—A case of trichosporia (*piedra nostras*) observed in France, by M. Paul Vuillemin.—On the thunderstorm in Paris of May 29, by M. J. Jaubert.

DIARY OF SOCIETIES.

THURSDAY, JUNE 13.

ROYAL SOCIETY, at 4.30.—Bakerian Lecture: Prof. James Dewar, F.R.S.—The Nadir of Temperature and Allied Problems. (1) Physical Properties of Liquid and Solid Hydrogen; (2) Separation of Free Hydrogen and other Gases from Air; (3) Electric Resistance Thermometry at the Boiling Point of Hydrogen; (4) Experiments on the Liquefaction of Helium at the Melting Point of Hydrogen; (5) Pyro-Electricity, Phosphorescence, &c.

MATHEMATICAL SOCIETY, at 5.30.—Remarks on the Quartic Curve $2\alpha^3\beta+m\beta^3\gamma+n\gamma^3\alpha=0$: A. B. Basset, F.R.S.—The Theory of Cauchy's Principal Values, II.: G. H. Hardy.—The Rational Solutions of the Equation $x^3+y^3+z^3+\beta^3=0$: Prof. Steggall.—Invariants of Curves on the same Surface, in the Neighbourhood of a Common Tangent Line: T. Stuart.

FRIDAY, JUNE 14.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Observations of Mars made at Mr. Edward Crossley's Observatory, Bermerside, Halifax, during the Opposition of 1900–01: J. Gledhill.—A Modified Form of Revolving Occulter for Adapting the Exposure of the Sun's Corona to its Actinic Intensity at all Distances from the Moon's Limb: D. P. Todd.—The Oxford Determinations of Stellar Parallax—Reply to Prof. Turner: Sir D. Gill.—Sun-spots and Magnetic Disturbance: W. Ellis.—Observations of Nova Persei made at Birr Castle, Parsonstown: The Earl of Rosse.—Secular Variation in the Period of R. Carinæ: A. W. Roberts.—The Great Comet of 1901, as observed at the Royal Observatory, Cape of Good Hope: Sir D. Gill.—The Oxford Determinations of Stellar Parallax—Further Reply to Sir D. Gill: H. H. Turner.—Measures of Double Stars made at Mr. E. Crossley's Observatory, Bermerside, Halifax: J. Gledhill.—Corrections to reduce the Revised Madras Catalogue of Stars for 1835-0 to the Fundamental Catalogue of Auwers: A. M. W. Downing.—The Lyrids, 1901 April, observed at Cambridge: J. C. W. Herschel.

PHYSICAL SOCIETY, at 5.—On Herr Jahn's Measurements of the Electromotive Force of Concentration Cells: Dr. R. A. Lehfeldt.—Exhibition of a Set of Specimens of Jena Glass: Prof. S. P. Thompson, F.R.S.

MALACOLOGICAL SOCIETY, at 8.—Notes on *Ariophanta*, *Xestina*, *Nilgiria* and *Euplecta*: W. T. Blanford.—Pleistocene Shells hitherto unrecorded from the Raised Beach of Perim Island, Red Sea: Rev. R. Ashington Bullen.—On a Dibranchiate Cephalopod from the London Clay of Sheppy: G. C. Crick.—(1) Description of a New Species of *Acanthochites* from South Africa; (2) Description of a New Species of Helicina from the Pelew Island: E. R. Sykes.—On the Anatomy of *Helix politissima*, Pfeiffer, and its Generic Position in the Ariophantinæ: Lieut.-Colonel H. H. Godwin-Austen.

TUESDAY, JUNE 18.

ZOOLOGICAL SOCIETY, at 8.30.—Observations on some Mimetic Insects and Spiders from Borneo and Singapore: R. Shelford.—Further Researches upon the Molluscs of the Great African Lakes: J. E. S. Moore.—On the Collections of Birds made by Dr. Donaldson Smith in Northern Somali-land: Dr. R. Bowdler Sharpe.

MINERALOGICAL SOCIETY, at 8.—On the Anharmonic Ratio of Four Faces in a Zone: Alfred Harker.—On the Arrangement of the Chemical Atoms in Potassium-Alum and in some of the Bodies which display Tetartohedral Symmetry: William Barlow.—Remarks on Calaverite: Herbert Smith.

ROYAL STATISTICAL SOCIETY, at 5.—The Recent Gold Production of the World: Wynnard Hooper.

WEDNESDAY, JUNE 19.

GEOLOGICAL SOCIETY, at 8.—On Intrusive Tuff-like Igneous Rocks and Breccias in Ireland: J. R. Kilroe and Alexander McHenry.—The Use of a Geological Datum: Beeby Thompson.

ROYAL METEOROLOGICAL SOCIETY, at 4.30.—The Eclipse Cyclone, the Diurnal Cyclones, and the Cyclones and Anticyclones of Temperate Latitudes: H. Helm Clayton.—The Seismograph as a Sensitive Barometer: F. Napier Denison.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Examination of the Abbe Diffraction Theory of the Microscope: J. W. Gordon.

THURSDAY, JUNE 20.

ROYAL SOCIETY, at 4.30.

LINNEAN SOCIETY, at 8.—On the Freshwater Algæ of Ceylon: W. West and G. S. West.—On Coprophilous Fungi: George Massee and E. Salmon.—Revision of the Genus Hypericophyllum, Steetz, with Notes on certain Genera with which it has been confused: N. E. Brown.

CHEMICAL SOCIETY, at 8.—Ballot for the Election of Fellows.—The Direct Union of Carbon and Hydrogen, Part II.: W. A. Bone and D. S. Jerdan.—Ammonium and other Imidosulphites: E. Divers and M. Ogawa.—Nitrilosulphates: E. Divers and T. Haga.—The Decomposition of Hydrocarbons at High Temperatures: W. A. Bone and D. S. Jerdan.—The Sugars from Cellulose: H. J. H. Fenton.—On a Theory of Chemical Combination: G. Martin.—On the Occurrence of Paraffins in the Leaf of Tobacco: Dr. T. E. Thorpe, C.B., F.R.S., and John Holmes.—Studies in the Camphane Series, Part IV.: M. O. Forster.—On the Decomposition of Carbon Dioxide, when submitted to Electric Discharge at Low Pressures: Dr. J. N. Collie, F.R.S.—Two New Substances in Lemon Oil: H. E. Burgess.

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